[10191/2272]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Ulrich METZ
Serial No.	:	To Be Assigned
Filed	:	Herewith
For	:	WIPING DEVICE FOR A WINDSHIELD
Art Unit	:	To Be Assigned
Examiner	:	To Be Assigned

Assistant Commissioner
for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT AND
37 C.F.R. § 1.125 SUBSTITUTE SPECIFICATION STATEMENT

SIR:

Please amend the above-identified application before examination, as set forth below.

IN THE SPECIFICATION AND ABSTRACT:

In accordance with 37 C.F.R. § 1.121(b)(3), a Substitute Specification (including the Abstract, but without claims) accompanies this response. It is respectfully requested that the Substitute Specification (including Abstract) be entered to replace the Specification of record.

IN THE CLAIMS:

On the first page of the claims, first line, change "What is claimed is:" to:
--What Is Claimed Is:--.

Without prejudice, please cancel claims 1 to 18 and please add new claims 19 to 40 as follows:

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19. (New) A wiper device for a window of a motor vehicle, the wiper device comprising:

a wiper blade;

a mechanical system to drive the wiper blade; and

a control device to compensate for clearances of the mechanical system as a function of at least one of load changes and a service life of the mechanical system.

20. (New) The wiper device of claim 19, wherein the control device compensates for the clearances as a function of the service life.

21. (New) The wiper device of claim 19, further comprising an electronically reversible drive, wherein the mechanical system is operable to rotatably move the wiper blade via the electronically reversible drive between an upper wiper blade end position and a lower wiper blade end position associated with two drive end positions;

wherein, to compensate for the clearances, the control device is operable to change the two drive end positions for at least one of as a number of load changes increases and as the service life of the mechanical system increases.

22. (New) The wiper device of claim 19, wherein the service life of the mechanical system is determined by a distance traveled by the motor vehicle.

23. (New) The wiper device of claim 19, wherein the control device is operable to compensate incrementally one of every 50,000 to 200,000 wiper periods and every 50,000 to 200,000 load changes.

24. (New) The wiper device of claim 22, wherein the control device is operable to compensate incrementally every 2,000 to 10,000 km.

25. (New) The wiper device of claim 19, wherein the control device is operable to compensate continuously one of prior and subsequent to each wiping period.

26. (New) The wiper device of claim 21, wherein the control device is operable to compensate only at a drive end position corresponding to the upper wiper blade end position.

27. (New) The wiper device of claim 19, wherein the control device is operable to compensate as a function of a velocity of a motion of the mechanical system.

28. (New) A method for controlling a wiper device of a motor vehicle, the method comprising:

driving a wiper blade via a mechanical system driven by an electronically reversible drive; and

compensating for clearances of the mechanical system as a function of one of load changes and a service life of the mechanical system.

29. (New) The method of claim 28, wherein the clearances are compensated as a function of the service life.

30. (New) The method of claim 28, wherein:

the mechanical system rotatably drives the wiper blade between an upper and a lower wiper blade end position associated with two drive end positions and defining a swing angle; and

a control device compensates for the clearances by changing the drive end positions at least one of as a number of load changes increase and as the service life of the mechanical system increases.

31. (New) The method of claim 30, wherein the service life of the mechanical system is determined by a distance traveled by the motor vehicle.

32. (New) The method of claim 30, wherein the control device compensates incrementally one of every 50,000 to 200,000 wiper periods and every 50,000 to 200,000 load changes.

33. (New) The method of claim 31, wherein the control device compensates incrementally every 2,000 to 10,000 km.

34. (New) The method of claim 30, wherein the control device compensates continuously one of prior and subsequent to each wiping period.

35. (New) The wiper device of claim 30, wherein the control device compensates only at a drive end position corresponding to the upper wiper blade end position.

36. (New) The method of claim 30, wherein the control device compensates as a function of a velocity of a motion of the mechanical system.

37. (New) The wiper device of claim 19, wherein the control device is operable to compensate incrementally one of every 100,00 wiper periods and every 100,000 load changes.

38. (New) The wiper device of claim 22, wherein the control device is operable to compensate incrementally every 5,000 km.

39. (New) The method of claim 30, wherein the control device compensates incrementally one of every 100,000 wiper periods and every 100,000 load changes.

40. (New) The method of claim 31, wherein the control device compensates incrementally every 5,000 km.

Remarks

This Preliminary Amendment cancels claims 1 to 18, without prejudice. The Preliminary Amendment also adds new claims 19 to 40. The new claims conform the claims to U.S. Patent and Trademark Office rules and do not add new matter to the application.

In accordance with 37 C.F.R. § 1.121(b)(3), the Substitute Specification (including the Abstract, but without the claims) contains no new matter. The amendments reflected in the Substitute Specification (including Abstract) are to conform the Specification and Abstract to U.S. Patent and Trademark Office rules or to correct informalities. As required by 37 C.F.R. § 1.121(b)(3)(iii) and § 1.125(b)(2), a Marked Up Specification comparing the Specification of record and the Substitute Specification also accompanies this Preliminary Amendment. Approval and entry of the Substitute Specification (including Abstract) are respectfully requested.

The underlying PCT application, PCT/DE01/01550 includes an International Search Report, dated December 9, 2001. A translation of the Search Report is annexed hereto.

Applicant submits that the subject matter of the present application is new, non-obvious, and useful. Prompt consideration and allowance of the application are respectfully requested.

Respectfully Submitted,

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Dated: 3/19/2002

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[10191/2272]

WIPING DEVICE FOR A WINDSHIELD

[Background Information] FIELD OF THE INVENTION
The present invention [is directed] relates to a device and a method for wiping a window [according to the definition of the species in the independent claims.].

[Numerous such devices are already known from the related art. These devices] BACKGROUND INFORMATION
Devices for wiping a window may have an electric motor, a mechanical system, as well as one or more wiper blades, which [are] may be swivel-driven by [the] an electric motor. In [the] a motor vehicle, the wipers [then] may swivel between an upper wiper blade end position, which [is normally] may be located in the region of the A-pillar of the vehicle, and a lower wiper blade end position, which [is typically] may be located at the lower edge of the windshield.

[As a rule, the] The mechanical system [includes] may include a crank drive made up of torque rods and connecting rods, which [are] may be interconnected by bearings. Since, during operation of the wiper device, considerable bearing forces [are] may be constantly exerted transversely to the bearing axis, it [must] may be made from an especially high-quality material to prevent premature wear. Alternatively, the wiper blade end positions [must] may be situated far enough from the A-pillar or the lower window edge, to compensate for displacements of this position due to wear.

[Summary of the Invention] SUMMARY OF THE INVENTION
[The device according to] According to an exemplary device and/or exemplary method of the present invention [having the features of the main claim has the advantage that], a control device [compensates] may compensate for clearances of the

mechanical systems, which may become greater as the number of loads increases, due to wear. Since constant load changes may subject the crank drive bearings to wear, thereby degrading bearing quality, a shifting in the reversing position of the wiper blades on the window [occurs] may occur with increasing age of the vehicle or with increasing age of the wiper device. These clearances of the mechanical systems [are] may be compensated for with the aid of a control device according to an exemplary embodiment and/or exemplary method of the present invention, so that the wiper blades [will always] may return to the same position over the entire service life of the wiper device.

[It is also advantageous to compensate for the] The clearance of the mechanical system as a function of service life may also be compensated, since vibrations that may occur during vehicle operation may also cause the bearing play to increase, due to the [own] weight of the individual components of the wiper device.

[It is also conceivable to use an] An overlapping compensation as a function of load change and service life may be used.

The [

Advantageous further refinements of the device according to the present invention may be derived from the features recited in the dependent claims.

It is particularly advantageous for the] drive end positions, in which the reversible electric motor changes its direction of rotation, [to] may be modified as a function of service life or with an increase in the number of load changes. This [enables] may enable the wiper blade end positions to be precisely maintained, without requiring expensive sensors in the region of the windshield or the wiper blades to detect the exact position of the wiper blades.

If the service life of the mechanical system is dependent upon the distance traveled by the vehicle, [it is advantageous that no] a separate time measuring device may not be required in the vehicle. The distance traveled by the motor vehicle [is always known from the odometer that every motor vehicle comes equipped with.]may be obtained from the odometer of the motor vehicle.

[Furthermore, it is advantageous for the compensation to] The compensation may occur incrementally[, in particular] every fifty- to two-hundred thousand[, preferably] (e.g. every hundred thousand) wiping periods or load changes. In this manner, a compensation [is] may only be implemented if a measurable difference between the desired wiper blade end position and the actual wiper blade end position is reached.

[It is likewise advantageous to design the] The control device may be configured such that a compensation [is] may be effected every two- to ten-thousand kilometers. This [allows] may allow an incremental compensation, even if the vehicle is only used in fairly dry weather. [This is particularly advantageous in] In the case of cabriolets, which [are typically] may be used [only] in dry weather on secondary roads having uneven road surfaces, [where] vehicle vibrations [are] may be naturally more pronounced than on expressways.

[It is also advantageous] Compensation may be allowed to [let compensation] occur continuously after each wiping period. In this manner, an optimal wiper blade end position [is always] may be maintained[, and]. Also, there [is also] may be no need for additional signals from the odometer, the clock or a wiper-period counter.

[It is also advantageous to design the] The control device may be configured such that only the upper wiper blade end position, in the region of the A-pillar, is subject to

compensation. The area of the A-pillar [is] may be the critical area in which the wiper blade, on the one hand, [must] may need to be guided as closely as possible to the A-pillar in order to achieve as large a wiping field as possible, yet, on the other hand, [must] may not touch the A-pillar, in particular during rapid wiping operation. However, this may [easily] happen if there is no compensation for the increase in the clearance of the mechanical system. This [is] may not [quite] be as critical in the lower wiper blade end position, since this [is normally] may be only of secondary importance to the driver's field of vision.

[Brief Description of the Drawing] BRIEF DESCRIPTION OF THE DRAWINGS

[An exemplary embodiment of the present invention is represented in the drawing and explained in detail in the following description. The figures show:

Figure 1:] Figure 1 is a schematic depiction of [the] an exemplary wiper device according to the present invention[;].

Figure 2 [:] shows a part of [a] an exemplary wiper device according to the present invention, having a wiper blade in the lower wiper blade end position[;].

Figure 3 [: a] shows an exemplary wiper device according to the present invention as shown in Figure 2, but with the wiper blade in the upper wiper blade end position[;].

[and]Figure 4 [:] is a schematic representation of [a] an exemplary method according to the present invention.

[Detailed Description] DETAILED DESCRIPTION

Figure 1 depicts a wiper device 10 on window 12. Wiper device 10 has two wiper blades 14 and a mechanical system 16, as well as a control device 18.

In this case, mechanical system 16 includes a connecting rod 20, a torque rod 22 and an output crank 24. Attached thereto are wiper arms 26, which are equipped with wiper blades 14. Connecting rod 20, torque rod 22, crank 24 and wiper arms 26 are rotatably connected to one another via three bearings. Connecting rod 20 and torque rod 22 are connected via the torque rod bearing 28, the torque rod and the output crank via the output crank bearing 30, and output crank 24 with wiper arm 26 via wiper bearing 32.

Window 12, in this case, is the windshield of a motor vehicle. On its sides 34, it is framed by the A-pillars of the motor vehicle.

Wiper blades 14 are shown by continuous lines in a lower wiper blade end position 36, and by dotted lines in an upper wiper blade end position 38. The area between these two positions 36 and 38 includes a swing angle p.

Since the wiper device shown is a synchronized wiper device, wiper blade 14 is located in upper wiper blade end position 38 in the area of the motor vehicle's A-pillar, that is, in the area of one of sides 34 of window 12.

Mechanical system 16 is driven by a drive 40, which is designed as reversible, electronically commutable electric motor 40. It is connected to control device 18, which controls electric motor 40.

Figure 2 shows a cut-away portion of Figure 1. Wiper blade 14, wiper arm 26 are connected to output crank 24 via wiper bearing 32. It, in turn, is connected to torque rod 22 via output crank bearing 30, which is driven by electric motor 40 via torque rod bearing 28 and connecting rod 20.
In this case, electric motor 40 is equipped with a Hall sensor 42, which transmits signals indicative of the position of the

armature shaft of electric motor 40 to control device 18. As a result, it is [always] informed of the instantaneous position of connecting rod 20. In addition, control device 18 may also be connected to an odometer 44, for instance, and/or a counter 46 which detects the number of reversions of electric motor 40.

Drive 40, in this case, is in a lower drive end position 50, so that wiper blade 14 is in the lower wiper blade end position 36.

In Figure 3, the same area is shown as in Figure 2, but wiper blade 14 is in the upper wiper blade end position 38, and connecting rod 20, therefore, in the upper drive end position.

The functioning of the wiper device is described below.

Electric motor 40, via a worm and a worm gear, moves an output crank 46, to which connecting rod 20 is rotatably fixed. In order to move wiper blade 14, connecting rod 20 executes a swivel movement, with the aid of electric motor 40, between an upper drive end position 48 and a lower drive end position 50. Each of these corresponds to upper wiper blade end position 38 and lower wiper blade end position 36.

As a result of varying environmental influences on mechanical system 16, in particular on bearings 28, 30, 32, the bearing clearance of individual bearings 28, 30, 32 increases over time, leading to a shifting of wiper blade end positions 36, 38. Due to overswinging, this [might] <u>may</u> result, for instance, in wiper blade 14 striking the vehicle's A-pillar in upper wiper blade end position 38 during rapid wiper operation, causing damage to it within a very short period of time. During slow wiper operation, in which the wiper blade is dragged across window 12, upper wiper blade end position 38

would move more and more towards the inside, and swing angle P would, thus, become increasingly smaller.

According to the present invention, control device 18 is designed such that, with increasing service life, or with an increase in the number of load changes, the lower or upper drive end position 48, 50 is shifted. This shifting also depends, for instance, on the speed with which wiper blade 14 glides across window 12. As also already discussed, it [might] may, therefore, be useful to shift upper drive end position 48 towards smaller swing angles P during rapid wiper operation, in order to prevent wiper blade 14 from hitting the A-pillar, while drive end position 48 is shifted toward a larger swing angle P, by an angle y, in slow wiper operation. The compensation may be individually adapted to the motor vehicle.

The same compensation as in Figure 2 [is] may be analogously implemented in lower wiper blade end position 36. With increasing service life, lower drive end position 50 is shifted towards larger swing angles P, by an angle d, in slow wiper operation.

Figure 4 shows another exemplary embodiment of [a] an exemplary method according to the present invention. In a first step 60, the wiper device is switched to rapid or slow wiper operation. In a second step 62 and/or 64, the service life/operation duration and/or the number of load changes that have occurred thus far is determined. In a third step, the speed of wiper blades 14 is then determined, for instance, by determining whether the wiper device has been switched to fast or slow wiper operation. As a function of the results from second and third steps 62 through 66, drive end positions 48 and 50 of drive 40 are then determined in a fourth step 68, and drive 40 started in fifth step 70.

[Abstract] ABSTRACT OF THE DISCLOSURE

[The present invention relates to a] A wiper device for a window[(12)], in particular in a motor vehicle, [having] including a wiper blade[(14)], a mechanical system [(16)] that drives the wiper blade[(14)], and [having] a control device [(18), the control device (18) compensating] that compensates for the clearances of the mechanical system [(16)] as a function of load changes and/or as a function of service life [; as well as] and a method for operating such a wiper device.